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Annual Meeting Symposium

ANNUAL MEETING SYMPOSIUM

The Management of Science for Social Progress

EDITOR'S NOTE — At the 38th annual meeting of the Minnesota Academy of Science in 1970, a multi-discipline symposium examined various social implications of scientific and technological progress. The papers, representing a variety of general as well as subject-matter viewpoints, are presented here, along with abstracts of each prepared by Dr. G. Theodore Mitau, chancellor of the Minnesota State College System, who was moderator for the symposium.

ABSTRACTS of panelist comments appearing on following pages.

by G. THEODORE MITAU

1 Dean Hartwig stresses the view that scientific knowledge can resolve social ills, noting, for example, that scientific information can be channeled to serve the social innovator, the industrialist, a city council, or many another community decision-making body. Science, he says, provides these agencies with knowledge vital to their efforts for economic and social development.

2 Professor John Hoyt believes scientists are capable and willing to participate in the management of social progress, that they have the competence and knowledge which could be applied towards the solution of many of society's problems. This is so, he argues, despite the fact that scientists have not always been known for the breadth of their social vision or for eagerness to participate in the political processes. For Minnesota specifically, Professor Hoyt suggests the governor should be encouraged to establish an advisory staff for scientific inputs to social targets. Members on this commission would include representatives from science, industry, government, and from other segments of the public, and they could recommend both policies and action programs.

3 Senator Jack Davies calls upon scientists to educate legislators "to facts and formulas and possible solutions to problems." What is needed most are good "legislative bills; bills which implement soundly conceived ideas; bills which carry forward policies perfected through persistent re-examination by sharp and unrelenting minds." He feels scientists are equipped to take "a good idea and convert it into a good legislative proposal."

4 Professor Barrett proposes to enlist social and physical scientists to "aid in the improvement of man's urban environment;" to provide the research, the planning, and the expertise to revitalize urban living and to improve the quality of urban life.

5 Oliver S. Perry, offering a business opinion, counsels caution lest "a procession of pseudo-scientists, political medicine men, motley assortments of revolutionaries and other sharp and harsh-voiced carpetbaggers" exploit the "environmental crisis." He believes a systems approach is necessary for solution of environmental problems through a combination of good management, growing attention to the expertise of business, industry, and academic community. A conference in which representatives from science, education, industry, government, the communication media, and students could work jointly on approaches seeking improvement of the environment is included in his remarks.

6 Mr. Fisher sounded an alarm, calling upon scientists to leave the laboratory if necessary and work alongside their students to confront the urban crisis. He insists that a total commitment is essential in transcending the attitude of "business as usual." There is an urgent need to give positive direction to the student revolution now challenging the nation's colleges and universities, according to Mr. Fisher. It is regrettable that Mr. Fisher did not submit a paper for publication of his views in greater detail.

Projecting science into the Twentieth century

QUENTIN L. HARTWIG*

Science is at a self-created crossroad. Despite the accumulation of more than ten million scientific articles in the world's information banks, the problems of society continue to mount rather than decline, with many unfortunate impacts. The public has begun to question the value of research, and congressional appropriations for it are falling off. Science seems irrelevant to many students, and they are turning to other disciplines which they feel are more closely attuned to the needs of man.

Yet, there is every reason to believe that this bank of existing and forthcoming scientific knowledge can resolve social ills. To make the point, ten years ago it was considered a statement of sheer folly to say the moon could be traversed by man in 1970. Yet, an organization was evolved that coordinated the efforts of thousands of people to build and use a manned vehicle capable of landing on the moon and returning with men aboard. The solution of many social problems here on earth will require organization and coordination equal to that man-on-the-moon effort. If the organization and coordination is of any lesser calibre, the problem will always be ahead of the solution. The problem is basically related to the fact that since the Civil War, science has been primarily concerned with the generation of knowledge rather than with its application with social purposes. As a result, the scientific community throughout the world has developed a most intricate and productive apparatus to generate information, publish, and store it. However, relatively little scientific effort has been employed to develop an equally energetic and complex apparatus to retrieve and apply scientific information in cooperation with the appropriate segment of society – be it the social innovator, the industrialist, city council, civic association, or what have you. This has not only hampered the application process but also has frustrated the socially-minded scientist in his attempt to find scientific programs that provide him the opportunity to interact with society. The scientist also wonders if he should spend any significant amount of time in such effort, fearing he will receive little credit from the scientific community for it. Scientific recognition is for basic research – applications are second rate.

This is an area where scientific groups could make a tremendous contribution – recognition.

I am a firm believer in the necessity of basic research; however, I suggest that science should begin to re-structure in terms of a more balanced arrangement between basic and applied activities. For example, in dissemination efforts the scientific community must encourage programs designed to diffuse knowledge into society. Hardly a ripple was noted in the scientific community when the Federal government decided to abandon the State Technical Services of the Department of Commerce. No concern, yet this type of program documents and demonstrates application products of research which in turn convince the taxpayer that basic research is vital and necessary to economic and social development.

In this era of gaps, another chasm should be identified as seriously hampering the rate at which new and relevant technology is applied to social problems. I call it the facility gap. And I define it as the gulf between our nation's capability for generating knowledge versus the capability of our present facilities to apply it to social problems of man.

The landscape is dotted with complex Federal or institutionally-operated physical science oriented laboratories, many manned with 1,000 or more engineers and scientists conducting pure research or being involved in mission R. & D. Few such facilities exist on the application side. The scientist involved in resolving a social problem such as delivery of health services can only marvel at new technology. He is virtually helpless in applying it because the technical capability available to him to apply his orders of magnitude is less than the capacity which generated it.

For example, in medicine there is not in the United States one major facility of a thousand engineers or more for applying technology as it relates to diagnosis, treatment, and rehabilitation. A physically oriented facility will have whole buildings of staff available for prototype design and fabrication application. The medical complex of similar numbers of personnel will have one or two rooms and barely more engineers to accomplish the same purpose.

This imbalance of facilities seriously hampers the biological and medical professions in matching the relevant technologies to their requirements. It often places them in the position of begging for equipment which, if they receive it, confronts them with a dilemma of maintaining it.

I submit, therefore, that should science develop an effective application apparatus uniting sources of solutions with sources of problems, public acclaim and support would launch science into a new and exciting era.

* QUENTIN HARTWIG, dean of Lea College at Albert Lea, Minnesota, served as a section chairman for the Academy's annual meeting.

How can science participate in management of social progress?

JOHN S. HOYT, JR.*

I want to twist the general title of this workshop session into the question: "How can Science Participate in the Management of Social Progress?" In responding to that question I will make, and then discuss, two assumptions. First Assumption: Scientists are capable of participating in the management of social progress. Second Assumption: Scientists have, to date, failed miserably in exercising that capability.

Scientists, physical or social, will probably be quick to agree with the first assumption. And why not – it states a positive judgment that science has the knowledge, and the ability to apply that knowledge, towards the solution of the societal problems. Architects and engineers can design and build low-cost housing. Biologists and soil scientists know the causes and the cures for soil and water pollution. Meteorologists and physicists know the

origins and the effects of atmospheric degradation. Economists and political scientists are aware of the costs of demographic imbalance and the inefficiencies of local general government. And psychologists and anthropologists understand the processes of social and cultural change. In short, as academic, and in many cases, industrial and governmental "scientists," we believe that we have the competence and the knowledge that could be applied towards accepted societal goals.

I submit, however, that science, as a segment of our society, has abrogated its responsibility by inaction. It has, in fact, very nearly abdicated its rights to the radical, the rebellious, and the irresponsible.

Why?

Because, in general, scientists have tunnel vision. Not only do they not talk to other scientists outside their own disciplines; they don't even recognize that other disciplines exist or that cooperative efforts could produce useful answers to social problems.

Because, in general, scientists can't meet a deadline. This is a fault that is most prevalent with social scientists. Translated, the ivory tower complex says that "if I don't have a model that precisely fits the 'real world,' it is of no value as a tool for application to real world problems." Perfection is the watchword and, as a result, application is avoided at all costs. There seems to be little recognition that any answer better than the one currently in use is more valuable than no answer at all. Successive approximation is accepted as a respectable research tool but is rejected as a reliable policy instrument.

Because, almost without exception, scientists don't participate. The political process is the antithesis of science to most of us. Involvement in the process of social change is repugnant – and a nuisance that takes "too much time." What do we do now? Dr. Paul Erlich tells us that no matter what we do, we have only a 50-50 chance. I'm too much of a scientist and an optimist to believe humanity's chances are that poor. I must admit, however, that even Ehrlich may be an optimist if we don't get at it. Don't misunderstand me, science can't do the job by itself.

How?

By participating, by participating in the political process and in the debates about the direction of desirable social change.

By communicating – with each other and, more particularly, with the rest of society in a language which they can understand and to which they can respond.

By being decisive – or, put another way, by being willing to offer for consideration solutions which, although perhaps not perfect, at least represent a potential for improving the current problem situation.

Given that participation, that communication, and that willingness to make decisions, I believe we can answer my question: "How can science participate in the management of social progress?" Furthermore, that action can, of itself, stimulate the formation of a structure for the stated title of this workshop: "Management of Science for Social Progress."

By way of initiating that process, I propose that the participants in this meeting petition the Governor for the establishment of an Advisory Staff for Science Input to Societal Targets (ASSIST) with a clear charge to that group to recommend specific policy and action programs over the entire range of the current problems of the State of Minnesota. Such a staff could be made up of members from the sciences, from industry, from government, and from the citizenry of the state and, as such, could provide significant advice to both the executive and legislative branches of state government.

* JOHN S. HOYT, JR., is a professor of economics and program director for systems development in the Agricultural Extension Service of the University of Minnesota.

From people to law-makers – power and responsibility

JACK DAVIES*

The people of each state give to their legislature the law-making power. With this power goes basic responsibility for developing public policy. Since public policy, in addition to "shalls" and "shall nots," includes taxing and appropriating (and, thus, power to allocate or reallocate state resources), legislative responsibility and power are theoretically tremendous.

The *actual* power is exciting – but the facts of legislative life are more in the absence of power than in the ability to work miracles. The disappointment and frustration citizens sometimes feel from the failure of the legislature to solve all problems results primarily from limitations on legislative ability to solve problems, not from any deficiencies of good legislative intentions.

I would like to ask every citizen to do something about what I consider the greatest restraint on legislative opportunity to benefit our society.

The limitation with which I am concerned is legislative inability to discover the truth spontaneously. Legislators do not, I discover, have divine guidance. They worry and read and listen and question and guess and think. They sleep on it and take advice and ignore advice and give in to pressure and resist pressure. Ultimately, if someone stays with the proposition long enough, legislators become educated and even wise. But wisdom does not come automatically or inevitably, and it certainly does not come like a flash of lightning.

Fact is – the legislative process is an educational process. Fact is – the educational process often requires more than a single exposure, as we teachers know.

I think each wise citizen can share in the job of legislator education. Each wise citizen is hereby invited to pitch in on the great task of providing informational services to legislators.

But the job I have in mind is not the easy "write-a-letter" suggestion that is so often heard.

I would like citizens to educate legislators to facts and formulas and solutions which they have personally struggled to discover. Forget the great, simple truths and forget your own ideologies; work, instead, on a technical, detailed and complicated issue. If you do, you will have little competition from alternative legislative proposals.

You will also break through the prejudices, predispositions, and ideology which protect each legislative mind from new wisdom.

A great legal scholar, John Austin, once wrote:

> "I will venture to affirm, that what is commonly called the *technical* part of legislation, is incomparably more difficult than what may be styled the *ethical*. In other words, it is far easier to conceive justly what would be useful law, than so to construct that same law that it may accomplish the design of the lawgiver."

Few people seek out the "incomparably more difficult" task. The consequence is that millions say "there ought to be a law," but few take the difficult next step of saying "this bill – my bill – is what the legislature ought to enact." The greatest need in the legislature is not more intelligence or more responsiveness (with which we are pretty well supplied) (Or even more pay for legislators!) What is most needed are more good legislative bills; bills which implement soundly-conceived ideas; bills which carry forward policies perfected through persistent re-examination by sharp and unrelenting minds. If you prepare such bills you can give the legislature the benefit of your knowledge not in generalities, but in concrete, real life specifics.

At this point you may expect me to give an illustration of what I have in mind. But finding an illustration is difficult, and giving one might confine the scope of your imagination as you struggle to convert my generalities into specifics. As you make that struggle, however, you can perhaps imagine the lawmaker's frustration when a citizen describes a problem but fails to suggest any specific solution.

The best I can do is to give you two challenges. One is to seize a good idea and convert it into a legislative proposal, and I mean into specific words. Maybe you won't make all the words right, but there are specialists to touch up a bill after an intelligent amateur has done the hard thinking and writing. The second task is to educate first one legislator, then perhaps two others, to the merit of your proposal. Get them to take your draft to the bill-drafting agency for polishing. Then follow through to see the bill introduced in the legislature. After that keep after it. Don't give up. Expect progress to be slow! But keep educating.

If you start on this assignment and lose heart, find a partner with the particular talent you need to get over the hump or call any legislator you know and ask him to find you that helper. But plan to do the job mostly by yourself.

I occasionally dream this dream. What if the legislature, with its power, could fully tap the intellectual resources of this state? What tremendous things could be accomplished!

It is not in the legislative pattern to go out to do the tapping, however. So maybe the scholars of the state on their own initiative will bring to the legislature their understanding, their facts, their ideas, their bills. What tremendous things could be accomplished.

JACK DAVIES is a Minnesota state senator who caucuses with the DFL or liberal faction.

An urban revolution after the industrial revolution

ROBERT A. BARRETT*

> "The second America is the America of the internal migrations; the first migration that cleared the land west of the Alleghenies and opened the continent, the work of the land pioneer; the second migration, that worked over this fabric a new pattern of factories, railroads, and dingy industrial towns, the bequest of the industrial pioneer; and finally – and this brings us down to the present period – there is the America of the third migration, the flow of men and materials into our financial centers, the cities where buildings and profits leap upward in riotous pyramids. These three migrations have covered the continent and knitted together its present framework; and our efforts to promote social welfare, to 'make crooked cities straight,' and to conduct industries efficiently are based for the most part on the notion that this framework is complete and satisfactory – and final.
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> But the mold of America has not been set: we are again in another period of flow, caused like the flows of the past by new industrial methods, new wants and necessities, and new ideals of life, and we have before us the great adventure of working out a new pattern so that the fourth migration will give to the whole continent that stable, well-balanced, settled, cultivated life which grew out of its provincial settlement. We can hinder this tidal change and rob ourselves of its potential benefits by adjusting our plans to the forces that were dominant in the recent past; or we can remold our plans and guide our actions in terms of a more desirable future."

This quotation from Lewis Mumford's book, *The Urban Prospect,* (New York: Harcourt, Brace and World, 1968), effectively traces the transition of this country from a rural to an urban nation. The Twentieth century has literally been a revolutionary century following the earlier Industrial Revolution; the Twentieth century in America has witnessed an Urban Revolution. One need not cite statistics to convince the reader of the overwhelming dominance of the city as the location of people, finance, and various scarce resources. The city is the dominant fact of American life in the 1970's. Problems of the city become the most important for society, for science, and for the scholar.

The city has historically provided an elevating experience in the life of man. Found within cities have been those opportunities and those activities which have attracted man and which have permitted man to rise to his greatest heights. But the city, today, is in a condition of crisis. That crisis has an often-catalogued set of manifestations such as transportation, education, racism, pollution, crime, and general discontent.

It would be this individual's judgment that the crisis of the city is in large part a crisis of science because science has not responded to serve urban man as it previously served rural man. The abundance and the technical and social advances accomplished in previous dec-

ades and generations for rural man have not been duplicated for urban man in this century.

The story of the application of science and learning and research to the needs of an agrarian and rural people need not be recounted here. The potential of science to aid in the solution of urban problems in contemporary America is great but that potential has been only marginally addressed by the scientific community. The scientific community potentially could aid greatly in problems of pollution of the environment, movement of people and goods, the education of people of all ages, the disposal of the variety of wastes in our society, and hundreds of other questions which are of no small concern to our urban citizens of today. One cannot help but question how we, as an urban society, allocate the scarce resources available to serve our needs. How do we allocate our human resources, physical resources, and fiscal resources in this society?

But we also have a crisis of the city and science with regard to the manner in which man relates to other men and the manner in which he orders his society and provides for mechanisms and codes by which he should live in an urban community. Urban man lives in a variety of towns: the Old Town, the Micro Town, and the New Town. These various Towns, communities within the large urban environment, pose a complex mosaic of problems which the social scientist must address in this very crisis-ridden period of our society.

Questions occur to me which pose a set of dilemmas to the social scientists as they attempt to suggest and devise more effective mechanisms for urban man. One question is that of centralization or deconcentration of power and of service within the large urban community. A separate question revolves around the degree and nature of participation within the fabric and the processes of governance. A third question would raise the dilemma of planning in an economic and physical and political sense. Furthermore, the dilemma of implementation of such plans is one which has still avoided the social and physical scientist as he tries to improve the city as a home for man. Another question to which we must address ourselves is the manner in which we finance the services that man requires in an urban society and also how we evaluate the performance of the services which have been financed. A most prominent question for many urban dwellers today is how order can be maintained with the important goal of justice being protected. Likewise, the question of equality and opportunity for the many diverse people who inhabit our urban communities is a question which has not lent itself to simple solutions. This is merely an initial list of the types of questions posed by the experiences of man in the city to which social scientists and physical scientists must address themselves.

Finally, I would submit that the scholars, scientists, and society have responsibilities to urban man which have not been met. We are all involved in the solution of human problems, and it is a charge to each of us to enhance the living quality of human beings in the urban environment. To the scholar is presented a series of challenges calling upon his best responses to educate, to research, and to provide community services. To science is posed the urgent needs to research and develop human solutions to human needs. To society-at-large is posed the critical question of making the wisest use of our precious resources in urban societies.

The challenge is clear and present as we chart a course for social scientists and physical scientists to aid in the improvement of man's urban environment. For, to repeat Mumford's charge . . .

> ". . . We can hinder this tidal change and rob ourselves of its potential benefits by adjusting our plans to the forces that were dominant in the recent past; or we can remold our plans and guide our actions in terms of a more desirable future."

* Robert A. Barrett is professor of political science at Mankato State College and director of the Urban Studies Institute.

How to hit the bullseye after the fact

Oliver S. Perry*

Once upon a time, there was an archer famous far and wide for his skill with the bow and arrow. In the exact center of every target bullseye in his town rested an arrow shot from the bow of the famed archer. Finally, someone asked him the secret of his perfect aim . . . how he could hit the target right in the bullseye with such unfailing accuracy?

"It's simple," he replied, "I shoot an arrow, and then I go paint circles around it."

In my view, this old tale has particular relevancy to our current situation, termed by some as "our environmental crisis."

We saw during April, and particularly on April 22nd – officially called "Earth Day" but termed by some a secular Ash Wednesday – a lot of circles being painted around the bullseyes of our environmental problems. A procession of scientists, pseudo-scientists, political medicine men, a motley assortment of revolutionaries and other environmental carpet-baggers lighted signal fires but proposed precious few practical solutions. Even Dr. Paul Ehrlich, speaking at the University of Minnesota, abandoned his population crisis theme to take some wild swings at the President, the Vice President – The Carswell nomination, the Laotian situation, and various current social and political issues. The tone of Earth Day, in many cases, was too shrill, too harsh. The sincere efforts of those who planned Earth Day – To dramatize the problems of our environment – produced a result that I'm sure they never intended. The name of the game became FEAR, and I would submit that we've never moved responsibly toward effective action, as individuals or as a nation, from FEAR. I've seen nothing comparable since the Bomb Shelter Psychosis of the fifties.

Now to the central theme of this panel:

"What do you see as both the barriers and approaches to maximizing the potential in your field, relative to

problem-solving in society?" I will confine my remarks to the subject of management of our environment.

These are the barriers which I see:

A tendency of considering the problem in isolation by science, by government, by the public.

Strident demands for instant solutions, for unilateral decision-making.

The view that the solution lies wholly within the technological field – as if technology could produce a giant mop, one swish of which will clean the entire world.

The attitude that strict law enforcement will cure all the current abuses of our environment.

The lack of any established forums representative of all disciplines, all institutions.

And this is the positive side:

Growing recognition of the necessity of a managed approach to the solution of environmental problems.

Increasing commitment by business and industry of resources, manpower, to social programs.

Allocation by business and industry of research funds and manpower to recycling, to conservation of energy.

The huge resource of concerned young people who are seeking solutions – and guidance.

Earlier this spring I attended, in Washington D.C., a three-day symposium on management of our environment. It was a unique conference in that it brought together scientists, businessmen, government officials, educators, college youth. The conference was jointly sponsored by the Public Affairs Council, an industry organization, and the National Academy of Science, parent body of your Minnesota Academy.

I learned a new word there – multilogue. No word could better describe the tone of the conference. The conference concluded on a note of agreement that a comingling of disciplines and institutions offered the best hope for reasonable, intelligent, mutually agreed-upon courses of action to improve the quality of our environment.

In the Minnesota Academy of Science, you have a perfect vehicle to carry forward this concept of an interdisciplinary approach to local and state problems. I would therefore propose a conference, or indeed a series of conferences, in which scientists, educators, industry, government, students, and the media would participate.

The key word is management. Without management of our resources, without recognition of the inter-relationships and the inter-dependencies that make environmental improvement such a complex problem, we will continue to pursue the will-o-the-wisps of instant solutions – the band-aid approach.

I would conclude with the reminder – again calling on an old fable – that when Chicken Little was hit on the head with an acorn, he was convinced the sky was falling. He collected his friends and started a mad hegira that ended only in the fox's cook pot.

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Fall Meeting at Duluth After Winona Spring Session

Following the Annual Meeting April 30-May 1 at Winona, the Minnesota Academy of Science will hold its fall meeting at Duluth in September. The specific date will be early enough to avoid conflict with normal University and College calendars and is expected to coincide with the peak fall foliage conditions in the northern area.

The Academy's Political Science Section will again meet separately this spring, with the dates May 7-8 and the place Bemidji State College.